INTRODUCTION

Thank you for selecting the **Chipmunk** portable disk drive as a companion for your TRS-80® Model 100.

Your **Chipmunk** is a friendly little fellow. Displays, keystrokes and syntax will be familiar to you as a Model 100 user. However, the versatility of a disk drive adds some new operating features you will want to learn.

This manual will tell you how to get the most from your **Chipmunk**. We have tried to make it clear, concise and free of technical jargon. If you are reading this prior to using your **Chipmunk**, you're on the right track.

A general knowledge of the Model 100 is assumed. Instructions in the computer manual will not be repeated here. If you need help in learning about your computer, we recommend the excellent classes that are offered at Radio Shack Computer Centers.

Some advanced users may desire additional technical information. Given the simplicity of the **Chipmunk** itself, this is intended as a brief tutorial for all users, not as a programmers guide or technical reference manual.

We hope you enjoy your **Chipmunk** and welcome your comments, questions and suggestions.

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I. GETTING STARTED

1. ABOUT THIS MANUAL

Each chapter deals with a specific topic in a step-by-step tutorial format. If you have difficulty using your **Chipmunk**, please review the directions on what you are trying to do before calling for assistance.

Two sections are treated in considerable depth:

The section on "Chipmunk Power" is important for everyone. It tells in detail how to get optimum efficiency from the internal rechargeable power supply.

A detailed "Introduction to CDOS" is included for users who are not familiar with the principles of disk operating systems.

Information to be entered on the keyboard appears in **BOLDFACE CAPITAL LETTERS**. Information you will see on the Model 100 LCD display is distinctively printed in `this 10-pitch type face`.

Single keystrokes appear as **<F8>** (press function key 8). Keys to be pressed simultaneously are linked by a hyphen. **<SHIFT>-<UP ARROW>** means to hold down the shift key and press the up-arrow key. For example:

`Folder name:` **UTILITIES <E>**

At the "Folder name:" prompt, you type "UTILITIES" and press <ENTER>.

<u>Important cautions are underlined in the manual</u>. These few instructions will help you prevent data loss or possible damage to your equipment.

THE DISK DRIVE

Front View

1. Disk insertion slot
2. Disk eject button
3. Drive indicator light
4. Low battery indicator

Rear View

5. On/Off power switch
6. Computer interface plug
7. AC charger receptacle

THE DISK

3.5" Disk

1. Rigid plastic cover
2. Sliding protective metal cover
3. Write Protect Slot

2. CHIPMUNK ANATOMY

UNPACKING YOUR CHIPMUNK

The following items should accompany the **Chipmunk**:

> A 3.5" micro diskette;

> A ribbon cable for connecting the **Chipmunk** and the computer;

> A 110 volt AC charger;

> A host adapter (a "U"-shaped circuit board);

> A new, slotted cover for the bottom of the Model 100;

> Owners manual and warranty.

Unpack your **Chipmunk** carefully, making certain you have received these items. Contact Holmes or your dealer immediately if anything is missing.

CHIPMUNK DISKETTES

The **Chipmunk** uses "Sony-type" 3.5" micro diskettes. They are durable, but should be protected from excessive heat and magnetic fields. Leave the sliding metal cover closed and never touch the disk surface inside the plastic sleeve.

These disks are available from Holmes or your local Apple® dealer (the Macintosh™ uses them), or from mail order sources throughout the country.

3. CHIPMUNK POWER

Rechargeable nickel cadmium batteries inside the disk drive and the separate AC charger provide **Chipmunk** power. This permits three modes of operation:

BATTERY CHARGING ONLY

To recharge the batteries at the fastest rate, turn the disk drive power off. Plug the AC charger into a 110 volt household current electrical outlet. Then plug the round connector into the charger receptable on the back of the **Chipmunk**.

Time required for full charging will depend on how discharged the batteries are. When completely exhausted, they will charge sufficiently to operate the disk drive in 10-15 minutes, and will fully charge in about 6 hours. The AC charger will not overcharge the batteries.

Do not use the disk drive charger to power the Model 100.

AC OPERATION WHILE CHARGING

The main purpose of this mode is AC operation of the drive when household power is conveniently available.

However, the batteries will also charge when the AC charger is connected and powering the drive during use. Charging occurs when the drive is in the standby mode; i.e., when the **Drive Indicator Light** is off.

This method, with the disk drive power on and the **Chipmunk** in use, charges the batteries more slowly than the "Battery Charging Only" mode described above.

BATTERY OPERATION

Your **Chipmunk** is designed for extended periods of use with battery power. The **Chipmunk** uses battery power any time the AC charger is not connected.

Fully charged batteries yield more than 90 minutes of constant disk drive activity. In practical terms, this will allow 6-10 hours of use. The actual time will depend on the amount of drive activity your application requires.

If the batteries are too low for reliable operation, the **Chipmunk** shuts down entirely to safeguard your data. Files in the computer's memory and on disk are safe, but the batteries must be charged for continued operation.

The **Low Battery Indicator** on the front of the drive provides ample warning before the **Chipmunk** shuts down.

When the **Low Battery Indicator** light comes on you have 2-3 minutes of power for actual disk drive activity remaining. Practically speaking, this should give you 5-15 minutes to complete your work before shutdown.

The red LED that indicates a low battery condition may be hard to see in a brightly lit room. We recommend that you get in the habit of watching for it, especially when you first start using your **Chipmunk**.

NOTES ON THE POWER SUPPLY

The **Chipmunk** and Model 100 operate on separate power supplies. The power-up sequence (which device you turn on first) does not matter. Neither unit is harmed if one is turned off while the other remains on.

The **Chipmunk** charger produces approximately 1.5 volts more than the Model 100 AC adapter (26-3804). It should not be used as a power source for the computer.

Both adapter units have the same connector because the Model 100 AC adapter can be used as an emergency power supply and charger for the **Chipmunk**. It will power the drive, but it will not fully charge the batteries.

Disk drive activity consumes considerable power. To conserve batteries, the **Chipmunk** switches to a low-power standby mode when it is not actively reading or writing information on the disk. It is in standby mode any time the power switch is on and the **Drive Indicator Light** is off.

The drive does not disable the Model 100 **POWER** command. Left unattended, the computer will turn itself off unless you have changed this setting. The **Chipmunk**, however, will remain in its standby mode any time it is turned on.

A small reserve must remain in the batteries, even when the AC charger is used to power the **Chipmunk**. If the batteries are completely exhausted, turn off the disk drive and charge the batteries for 10-15 minutes.

The "shut down" condition that results from low or exhausted batteries is total. The disk drive effectively disconnects itself from the computer. None of the disk or **Chipmunk** ROM functions, including loading **CDOS** into the computer, will work until the drive is briefly charged.

The internal nickel cadmium batteries are made to tolerate thousands of cycles, and there is no danger of overcharging them using the AC charger supplied with the **Chipmunk**.

Never use any other charger with your **Chipmunk** (except the Model 100's AC adapter, as described above).

DEVELOPING GOOD "NICAD HABITS"

Nickel cadmium batteries have a unique "memory" property that makes a couple of precautions advisable.

> Avoid developing a pattern of using the drive for brief periods followed by full charging. This causes the batteries to develop a "memory" that is less than their full capacity;

> Periodically use your **Chipmunk** with battery power until the **Low Battery Indicator** light comes on;

> Fully charge the batteries after running them down (overnight if you wish).

You will soon acquire a feeling for how much work your **Chipmunk** can do between chargings. Developing good "nicad habits" and getting to know your **Chipmunk** will help you avoid exhausted batteries at crucial times.

Nickel cadmium batteries also perform best when they are used regularly. They discharge when stored, and the full charge you put on a week ago will not be a full charge today.

If you think of your **Chipmunk** as needing frequent exercise (using battery power), it will return the best, most consistent performance for you.

Use your **Chipmunk** frequently with battery power and keep an eye on the **Low Battery Indicator** for the best overall results.

1. REMOVING THE EXPANSION BAY DOOR

2. INSERTING THE HOST ADAPTER

3. CONNECTING THE RIBBON CABLE

4. THE CHIPMUNK CONNECTION

Installing the **Chipmunk** host adapter is very easy, poses absolutely no hazard to you or the Model 100, and does not affect the Radio Shack computer warranty.

1. With your Model 100 power off (not the Memory Power on the bottom, just the on-off switch on the right), place the Model 100 upside down with the front of the computer facing you (serial number right side up).

2. Using a coin, gently pry off the 3"-wide cover at the front/center of the computer (**Fig. 1 on p. 8**). This exposes the user-accessible expansion bay that is used to expand the capabilities of the Model 100.

3. Hold the host adapter (the "U"-shaped circuit board with the small pins on one side and the chips and connector on the other) as shown (**Fig. 2 on p. 8**). Hold it with the small pins facing down toward the Model 100.

4. Gently set the host adapter into the computer's expansion bay. It will only fit one way. The pins will line up naturally with the sockets in the Model 100.

5. Wiggle the host adapter slightly to position the pins exactly, then press it firmly until you feel the pins seat in place. Do not force the host adapter in, as you may bend or crush the pins.

6. Replace the solid plastic cover with the slotted cover that came with your **Chipmunk**. Installation of the adapter module is now complete, and this unit may be left inside your computer permanently.

To connect the **Chipmunk** to the Model 100 for use after the host adapter is installed in the computer:

1. Insert one end of the ribbon cable supplied with the **Chipmunk** into the connector on the adapter module **(Fig. 3 on p. 8)** until the locking "ears" close toward the center. The plastic lug on the connector will prevent you from plugging it in upside down.

2. Plug the other end of the cable into the disk drive, using the **Computer Interface Plug** in the back of the **Chipmunk**. Again, the plastic lug will keep you from plugging it in upside down.

The "**Chipmunk** connection" is now complete. With a little practice, this simple procedure will only take you a few seconds when you want to use the disk drive.

DISCONNECTING THE CHIPMUNK

The Model 100, **Chipmunk**, and connecting ribbon cable are designed to be carried separately, with the host adapter remaining inside the computer and the new cover in place. To disconnect the components:

1. Unplug the ribbon cable from the host adapter by pressing the locking "ears" outward to eject the cable end of the connector.

2. Disconnect the ribbon cable from the **Chipmunk** by pulling it out of the **Computer Interface Plug**.

The host adapter may be removed at any time with gentle upward pressure on the cable connector using the thumb and forefinger. If it is very firmly seated, a slight back and forth motion will dislodge it.

NOTES ON CHIPMUNK HARDWARE

Your **Chipmunk** is built to withstand the moderate shocks of portability, but it should always be handled with reasonable care.

Level positioning and stillness is not critical for operation. In fact, the drive will operate at a 90° angle (on its side), and will work well in most moving vehicles.

Disk drives are more subject to failure from wear, mishandling and environmental factors than non-mechanical electronic devices. Rough handling or prolonged exposure to dust, smoke, extreme temperatures or high humidity will increase the need for periodic maintenance, and will ultimately shorten the life of your **Chipmunk**.

Note that the host adapter does not obscure the ROM socket in the bottom of the computer. A ROM chip containing an application program may be installed with the host adapter in place.

The computer interface cable is narrow and flexible. It can be bent to any shape you desire, but do not pull or crimp it sharply near the connectors on the ends.

Your **Chipmunk** is shipped as a sealed unit. There are no user-serviceable parts inside the disk drive. If you suspect a hardware problem, the unit should be returned to Holmes for service.

DISK DRIVE HEAD CLEANING

Like a cassette or video recorder, disk drive heads pick up oxide particles from the disk that will degrade performance over a period of time. Periodic cleaning with a commercially-available disk drive head cleaning kit will prolong head life and minimize the chances of data loss.

II. INTRODUCTION TO CDOS

1. GENERAL COMMENTS

This section will help users who have never worked with disk drives or a disk operating system understand the **Chipmunk.**

Computers perform tasks for which they have been "programmed" with a set of instruction called "software". The Model 100 comes with five built-in programs that you always see on the Menu; e.g., BASIC and TELCOM.

These programs, along with all the other instructions that make the Model 100 behave as it does, are stored on a ROM (Read Only Memory) chip inside the computer.

ROM chips are permanently programmed when they are produced, as opposed to the RAM (Random Access Memory) chips used for temporary storage of information you enter into the computer.

Connecting a disk drive to your Model 100 makes the system more complex because the computer must now interact with another device. The computer itself is not "smart" enough to do this without an additional program.

This special program which enables a computer to save files to a disk, and to find and load them later, is called a "Disk Operating System" (DOS).

The **CDOS** (pronounced "see'dawss") Chipmunk Disk Operating System is stored on a ROM chip inside the disk drive. Therefore, no "system disk" is needed when using the **Chipmunk**, as is the case with most other computers.

2. CDOS FILE STRUCTURE

Each **Chipmunk** disk can store up to **358.5** Kilobytes of information (approximately 358,500 characters). While the structure of **CDOS** bears some resemblance to other popular operating systems, it is written specifically for the Model 100.

CDOS emulates the familiar Main Menu format of the Model 100 for displaying files. **CDOS** operations are executed by familiar function keys and keystrokes. More than 200 files can be stored on each disk using a series of menus that will help you organize your disks like a filing cabinet (see next page).

Three terms that are used throughout the rest of the manual should be defined now:

> **CDOS Menu** - The display of all the files in your Model 100 RAM memory; equivalent to the Model 100 Main Menu.

> **CDOS Directory** - The top level menu of files and folders on the disk in your **Chipmunk**.

> **CDOS Folders** - User-created lower-level menus of files and folders (sub-directories).

Files (programs or text files) are displayed as usual, in upper case with a `.DO`, `.BA` or `.CO` suffix.

Folders, which may contain both files and other folders, are displayed in lower case to distinguish them from files on the Model 100 display.

THE "FILING CABINET"

The purpose of any filing system is to organize the individual items in a file drawer or cabinet so they are easy to locate. Customarily, this involves first dividing them in some very general way, then subdividing them more specifically. These subdivisions may be further split into categories that are even more precise, and so on.

This is essentially what you will be doing when you create **CDOS Folders** on your disks. Most computer folks refer to these as "sub-directories".

One of the main functions of **CDOS** is to let you organize the vast storage capacity on each disk in some systematic way. The diagram on the next page should help clarify the principles of **CDOS**.

The system is like a filing cabinet in that programs and text files are placed inside folders (which you create and name). These folders can be nested; i.e., one folder may contain several others that are logical subdivisions of the first.

For example the **CDOS Directory** (equivalent to a file drawer) might contain a series of folders labelled by subject. Each of these folders might contain a number of other folders arranged alphabetically or chronologically.

To maintain the familiar Main Menu format of the Model 100, the **CDOS Directory** and **CDOS Folders** are limited to 24 entries (files or other folders) each. Trying to exceed 24 will cause a `Too many files` error.

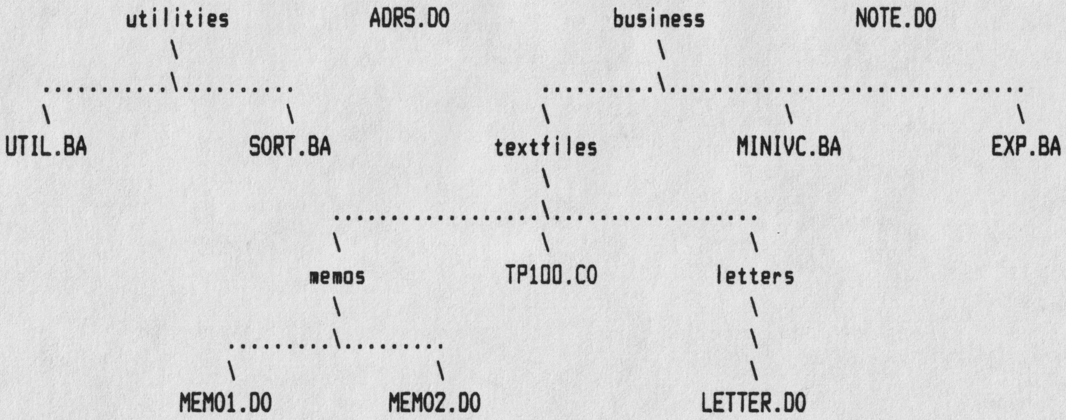
Each folder occupies 1.5K on the disk and all files saved to disk are stored in multiples of 1.5K depending on their length.

Disk and folder names may be up to 9 characters long, using any combination of ASCII characters from 32 to 255. This unique feature lets you use the Model 100 graphics characters, punctuation or numerals. Therefore, `11/24/84` is a legal folder name.

Disks should be clearly labelled. Each disk's large storage capacity makes it easy to lose track of files you have saved. Precise, descriptive folder names will help you avoid the "I know it's here somewhere" syndrome.

The same filename can exist in different folders on the same disk. Saving a file twice into different folders is an effective method of doing a quick, interim backup.

SCHEMATIC DIAGRAM OF CDOS FILE STRUCTURE


utilities
ADRS.DO
business
NOTE.DO
UTIL.BA
SORT.BA
textfiles
MINIVC.BA
EXP.BA
memos
TP100.CO
letters
MEMO1.DO
MEMO2.DO
LETTER.DO

This diagram shows how a disk can be organized so that programs and files are very easy to locate. The top-level menu, or directory, contains two text files, ADRS.DO and NOTE.DO, and two folders, utilities and business.

The utilities folder contains two BASIC programs, UTIL.BA and SORT.BA. The business folder contains MINIVC.BA and EXP.BA and a folder of textfiles consisting of TP100.CO, and two more folders, memos and letters.

III. USING THE CHIPMUNK

1. GENERAL GUIDELINES

This section uses a tutorial format to explain the displays and features of disk operation. We suggest you use your Model 100 and **Chipmunk** to follow along through this section.

You will want to have a blank disk or two on hand for practice use. Also have a couple of RAM files (text or programs) loaded in the computer for practice, but save important files on tape or wafer until you give your **Chipmunk** a complete check and learn about its operation.

Never turn the disk drive or Model 100 power off or remove the disk while the **Drive Indicator Light** is on! Doing this will almost certainly cause lost data or render the disk completely unusable.

Change disks only at the **CDOS Menu**.

All **CDOS** prompts respond to either upper or lower case keyboard entry and convert it automatically to the correct format. For example, if you enter a folder name in upper case, **CDOS** will change it to lower case.

If you make a mistake while typing a response to a **CDOS** prompt either **<DEL-BKSP>** or **<LEFT-ARROW>** will backspace and erase one character at a time so you can correct the entry before you press **<ENTER>**.

If you press a wrong function key or change your mind, **<F8>** or **<SHIFT>-<BREAK>** will return you to the **CDOS Menu**.

ERROR MESSAGES & TROUBLE-SHOOTING

A particularly annoying characteristic of most disk operating systems (and of the Model 100) is the cryptic form in which they display error messages.

You are probably used to seeing such things on the Model 100 as `?SN Error` or `?OM Error in 7`.

We soon learn to recognize the first one above as a syntax error, along with a few others that crop up with some regularity. The rest send us scurrying to the manual for an explanation.

When **CDOS** is loaded and your **Chipmunk** is on line (connected and turned on), any error message you receive will include its plain English explanation.

This includes all Model 100 error codes, not just the error messages that are part of **CDOS**. Thus, a "TM" error will display as `?TM (Type Mismatch) in 10`.

This feature is part of the **CDOS** ROM, and it only functions when your **Chipmunk** is in use.

Once in a great while your **Chipmunk** may seem to get confused or lost in the middle of a **CDOS** function (such as saving a file to disk). This is because it must interact to very close electronic tolerances ("interrupts") with your Model 100.

If this happens while your batteries are well-charged **<SHIFT>-<BREAK>** or **<RESET>** should get you back to where you began, ready for another try.

This sort of thing should only happen rarely, if at all, and persistent problems like this should be reported in complete detail to Holmes or your dealer.

2. LOADING CDOS

If you are going to use battery power, make sure the batteries are well-charged. Remember that they must contain some reserve power, even if you are using the AC adapter to power the **Chipmunk**.

It should <u>never</u> be necessary to "cold start" your Model 100 (losing all files) to load or remove **CDOS**.

1. Connect the Model 100 to the **Chipmunk** and turn both power switches on (it doesn't matter which you turn on first).

2. Make sure the Model 100 Main Menu shows at least `5067 Bytes free`. **CDOS** requires this space to load although it only uses **4218 bytes** during operation.

3. Press the recessed black **<RESET>** button at the rear of the computer next to the RS-232C connector.

The **CDOS Menu**, almost identical to the Model 100 Main Menu, will appear. Note that it shows all the files in your computer, plus new copyright information and a set of function keys. Your Model 100 now contains **CDOS**.

```
Chipmunk (C) 1984 - Holmes/Amtek    v2.4
 BASIC     TEXT       TELCOM    ADDRSS
 SCHEDL    ADRS.DO    NOTE.DO   UTIL.BA
 SORT.BA   MINIVC.BA  SORT.CO   TP100.CO
 -.-       -.-        -.-       -.-
 -.-       -.-        -.-       -.-
 -.-       -.-        -.-       -.-
Info Load Save      Name Help Kill Disk
```

3. REMOVING CDOS

<u>Do not use **CDOS** unless your **Chipmunk** is connected to the computer and turned on</u>.

When **CDOS** is loaded, the Model 100 must interact with the disk drive to load various **CDOS** "overlays", or program modules, as they are needed.

An `Error 68  ** NO DISK **` or unpredictable error conditions, "freeze-ups" and "cold starts" may result if you try to use your computer with **CDOS** while the **Chipmunk** is disconnected or turned off.

CDOS is extremely easy to remove, with or without the disk drive connected.

1. Go into BASIC on the Model 100 by placing the bar cursor over `BASIC` and pressing **<ENTER>**.

2. Type **LFILES OFF** and press **<ENTER>**.

3. Press **<F8>** and you will see the regular Model 100 Main Menu with the date, day and time in the upper left and `nnnnn Bytes free` in the lower right.

CDOS is no longer resident in the Model 100. Note that the **4218 bytes** that **CDOS** occupies in RAM memory are now available for use.

To reload **CDOS**, simply repeat the three steps on the previous page, using **<RESET>** at the Main Menu. LFILES ON is <u>not</u> a legal command and does <u>not</u> work.

CDOS will load faster (one second vs. four seconds) if there is <u>no disk</u> in the drive.

4. FUNCTION KEYS

CDOS is primarily a "function key driven" program. Although most operations can also be initiated using other means, function keys are the most direct way to invoke **CDOS** features.

Load **CDOS** into your Model 100 and observe the bottom line of the computer's display:

```
Info Load Save      Name Help Kill Disk
```

These entries correspond to the function keys above the computer's main keyboard on the left side:

```
Info Load Save      Name Help Kill Disk
 F1   F2   F3   F4   F5   F6   F7   F8
```

In addition to disk functions, **CDOS** includes several convenient features to save you keystrokes or give you information on the files in your computer.

Remember, even though some of these function keys to not involve disk access, they will only work reliably when the **Chipmunk** is connected and turned on.

The Info and Kill keys perform operations on both disk and non-disk files. We will first explain the non-disk function keys in terms of the Model 100 and files in its RAM memory.

F1 - THE "INFO" KEY

The information available with **<F1>** at the **CDOS Menu** pertains to computer RAM files and the Model 100 itself. We will soon see that this function key provides more information on disk files.

1. Place the bar cursor on any computer ROM file (`BASIC`, `TEXT`, etc.) and press **<F1>**.

```
Nov 25,1984 Sun 15:10:30
 BASIC      TEXT       TELCOM     ADDRSS
 SCHEDL     ADRS.DO    NOTE.DO    UTIL.BA
 SORT.BA    MINIVC.BA  SORT.CO    TP100.CO
 -.-        -.-        -.-        -.-
 -.-        -.-        -.-        -.-
 -.-        -.-        -.-        -.-
11026 Bytes free
```

The top line now shows the date, day and time. The function keys have been replaced by the number of bytes free in the computer's memory (displayed on the left to avoid confusion with the Main Menu).

2. Press any key to return to the **CDOS Menu**.

3. Now move the bar cursor to any RAM file in the computer (`.DO`, `.BA` or `.CO`) and press **<F1>**.

The date, day and time reappears on the top line, but the bottom line now displays the `bytes in file.` of the RAM file you selected.

4. Press any key to return to the **CDOS Menu**.

F5 - THE "NAME" KEY

This function key renames files in the Model 100's RAM memory. It is designed to save you typing.

1. Place the bar cursor on any computer RAM file (.DO, .BA or .CO) and press **<F5>**.

A `Name as:` prompt appears on the bottom left of the screen along with a flashing cursor.

2. Type in a new filename that follows the Model 100 conventions for legal filenames, plus the extension or suffix (.DO, .BA or .CO) of the original file.

3. Press **<ENTER>**. The display will blink briefly and reappear with your new filename in place of the old one.

If you make a mistake, you can re-enter your new name after erasing the error with the **<DEL-BKSP>** or **<LEFT-ARROW>** keys.

Several common error messages may come up when you are renaming files. Press any key to recover.

`Error 5 Illegal Function Call -`
You forgot to include the extension or suffix, or typed a different one from the original file's.

`Error 55 Bad Filename -`
You entered a new filename with too many characters.

`Error 60 Bad Drive Number -`
You used a number or punctuation as the first character in the new name and your **Chipmunk** is confused.

F6 - THE "HELP" KEY

This key is included on the function key line for use in **CDOS** applications programs as a convenient way of accessing help files on a program disk.

It is non-functional under **CDOS** itself, and will give a `No help files found` message.

Complete, plain English error messages that appear at the appropriate times were judged as most useful to the majority of users.

Given memory constraints and the ease of use of the **Chipmunk**, the clear error messages were substituted for on-screen documentation in the **CDOS** ROM program.

F7 - THE "KILL" KEY

This function key removes directory entries from the Model 100's RAM memory and from disks. Like the Name key, it is designed to save you typing.

1. Place the bar cursor over any file you wish to delete and press <F7>.

The Kill(Y/N)? prompt will appear in the bottom left of the display with a flashing cursor.

2. Verify your intention to remove the file with a <Y> or <y> and the file or folder will be "killed".

If you change your mind, the computer will only accept an <N> or <n> response to abort the operation. A negative response will leave the file intact.

This function key will remove files from the Model 100's RAM memory (i.e., remove them from the directory). It will also "kill" files and folders from the disk in your **Chipmunk**.

A folder cannot be removed from a disk until all the files in that folder are individually "killed". Trying to "kill" a folder that still contains files will result in an Error 62 File Already Exists.

Please remember that making files so easy to "kill" has one obvious drawback. Always take a moment to be sure of your intent before you enter <Y> or <y> at the Kill(Y/N)? prompt.

"NO DISK" ERROR MESSAGES

We appreciate your patience in following us through the first half of this manual. Trying to be as concise as possible, we hope we didn't oversimplify the material or omit any essential information.

We will continue to introduce error messages as we discuss the functions that are likely to generate them.

Remember to use **CDOS** only when your **Chipmunk** is connected and turned on. Note the difference between two very similar error messages:

`Error 68  ** NO DISK ** -`
Your Model 100 cannot access the **Chipmunk** because the drive is either not connected, it is turned off, or the batteries are exhausted.

`Error 68 No Disk -`
There is no disk in the **Chipmunk** although it is connected and turned on.

Also, the Model 100 Main Menu will just blink at you and ignore your request if you try to load **CDOS** into the computer under the following conditions:

> When the battery level of the **Chipmunk** is too low;

> If you do not have the necessary amount of memory (5067 bytes) available to load **CDOS**.

To minimize read/write errors during disk operation, we recommend using only premium quality micro diskettes, handling them with reasonable care, and backing up your important files promptly.

5. THE FORMAT UTILITY

Before a blank disk can be used in any disk drive, it must be "formatted" by the computer.

Formatting is done by a utility within the **CDOS** operating system. It electronically divides the disk into sections for orderly storage and retrieval of data.

In addition to creating an electronic "map" on the disk, the **CDOS** format utility also checks sections of the disk (called "tracks") and smaller divisions of each track (called "sectors") for any flaws.

If the format utility encounters physical or magnetic flaws, it will "lock out" individual sectors so that no data can be written on that part of the disk.

Disks are made to last for many months, even with frequent use. You can re-format and re-use any disk that contains information you no longer need to save.

<u>Formatting erases any data stored on the disk</u>.

<u>THE "WRITE-PROTECT" SLOT</u>

Your disks have a small hole, about 1/8" square, in one corner of the plastic case. A sliding tab (usually red) snaps open and closed to expose or cover the hole.

This is the **Write Protect Slot.** Sliding the tab to <u>open</u> the hole will prevent the computer from writing any data on the disk or changing existing files.

Normally this tab should be <u>closed</u>. Trying to format or save any data to a write-protected disk will display an `Error 64 Write Protect` message.

FORMATTING A BLANK DISK

It takes just under a minute to prepare a disk for use with the **CDOS** format utility. With your **Chipmunk** connected and the disk operating system loaded:

1. At the **CDOS Menu,** press **<F1>** (`Info`) to make sure you have at least `6795 Bytes free`.

This is the amount of buffer space in the computer needed to format a disk.

2. At the **CDOS Menu,** press **<F8>** (`Disk`).

When a disk is blank (unformatted), the **Chipmunk** will try to read the disk for about seven seconds before showing `In disk` on the Model 100 display.

About four seconds later a `Format disk(Y/N)?` prompt will replace the function key labels on the bottom line. An **<N>** or **<n>** response will abort the operation.

3. Press **<Y>** or **<y>** to begin the formatting.

The screen will clear and display `Formatting nn` as data is written onto the disk from track 0 through 79. After the data is written, the **Chipmunk** works backward to verify that no physical or electronic defects exist and displays `Check track nn`.

4. The computer will then show a `Name disk as:` prompt. Type in a name that describes the intended use or contents of the disk and press **<ENTER>**.

Disk names may be up 9 characters long (naming of disks and folders is described on p. 15). Extra characters you type in will be dropped from the name.

REFORMATTING A USED DISK

When the data on a disk is no longer needed, the disk may be reformatted and used again. Remember, all data on the disk will be erased when you reformat.

The procedure is identical to the one for a blank disk (described on the previous page), except that it is initiated by a function key.

If you just formatted a blank disk, put it in the **Chipmunk** and press **<F8>** (`Disk`).

The computer will now display the **CDOS Directory** of the disk (the top-level menu that was created when you formatted it) and a new row of function keys.

```
358.5K free.          In disk disk name
                  Empty disk






Info Load Form                      Kill Menu
```

Whenever you access a formatted disk using **<F8>** these function keys will appear.

If you want to reformat the disk, press **<F3>**. The function keys will be replaced by `Format disk(Y/N).`

Proceed as described on the previous page. Again, you will need at least **6795 bytes** free in the Model 100 to avoid an `Error 7 Out of Memory.`

NOTES ON FORMATTING AND BACKUPS

A disk that formats without any flawed sectors will display `358.5K free.` on the **CDOS Directory**.

Flawed sectors are "locked out" so that no data can be written on them. The computer display will identify flawed sectors by number as the format utility runs.

<u>You may use disks with flawed sectors</u>, although each sector that is locked out will reduce the available storage on the disk by 1.5K.

Track 0 is used to store "system information" (the directory and allocation tables) on the disk. If this track is flawed, the formatting operation will abort. Consider the disk unusable if this condition persists after a couple of retries.

Naming disks and folders is strongly advised, but not absolutely necessary. If you press <ENTER> instead of typing in a disk or folder name, the entry will default to an asterisk (*).

The format utility may be aborted at any time by pressing <SHIFT>-<BREAK>. This will return you to the **CDOS Menu**. However, when the process is interrupted after it begins, the **Chipmunk** will subsequently read the disk as being blank.

<u>Making backups is a critically necessary aspect of using any disk drive</u>.

Various methods of making backups, or duplicate copies of your data, on the **Chipmunk** are discussed in the "Utilities" section of this manual.

6. SAVING FILES TO DISK

Insert the blank disk you just formatted into your **Chipmunk**. Your Model 100 should contain several files.

NOTE: Menus and filenames shown here are hypothetical.

Using the function key method, files with <u>any</u> two-letter extension can be saved to disk. The includes the usual .DO, .BA and .CO suffixes, as well as the special extensions generated by some applications programs.

1. At the **CDOS Menu**, use the arrow keys to move the bar cursor over a program or text file you wish to save to disk (e.g., UTIL.BA).

2. Press **<F3>** (Save).

The **CDOS Directory** you saw earlier will appear with some changes:

```
Saving UTIL  .BA    In disk disk name
                 Empty disk






                Save Fold                    Menu
```

3. Press **<F3>** (Save) again or **<ENTER>** to save.

The **Chipmunk** will save the file to disk and return you to the **CDOS Menu**.

To confirm that the file was actually saved, press **<F8>** (Disk) again. The **CDOS Directory** will reappear:

```
355.5K free.         In disk disk name
 UTIL.BA   -.-        -.-       -.-
 -.-       -.-        -.-       -.-
 -.-       -.-        -.-       -.-
 -.-       -.-        -.-       -.-
 -.-       -.-        -.-       -.-
 -.-       -.-        -.-       -.-
Info Load Form                 Kill Menu
```

The name of the file you selected now appears as the the first entry in the **CDOS Directory** that has been "filled in" to emulate the standard menu format.

The number of bytes free on the disk is reduced by the size of the file you just saved (in 1.5K increments).

Note that saving a file involves two operations:

> Pressing **<F3>** at the **CDOS Menu**
to select the file to be saved;

> Pressing **<F3>** or **<ENTER>** to
actually save the file to disk.

The reason for this will become apparent shortly when we learn how to create folders.

If you change your mind, you can terminate the save operation at any time by pressing **<F8>** (Menu).

Never change disks during a disk save operation!

F1 - "INFO" ON DISK FILES

1. With the bar cursor on the name of the file you just saved, press **<F1>** (`Info`).

```
2274 bytes in file. 11/25/84 11/25/84
```

The bottom line of the display now shows the length of the file in bytes, followed by two dates.

The first date is the date that the file was written to disk. You will see today's date if your Model 100 has been set to the correct date using **DATE$**.

The second date is an "update flag" date that will be adjusted whenever you make changes in the file and re-save it onto the disk.

This feature will help you keep track of your disk files if you are careful to maintain the correct date in your Model 100.

DISK SAVE ERRORS

If the size of the file you are saving exceeds the available disk space `Error 63 Disk Full` will occur. Save the file on a disk with more available space.

When the **Write Protect Slot** in the disk in your **Chipmunk** is open (the disk is write-protected), attempting to save a file will yield `Error 64 Write Protect.`

THE "SAVE ALL" FEATURE

Your **Chipmunk** will save the entire contents of the Model 100's RAM memory to disk, limited only by the space remaining on the disk and the number of directory or folder entries available.

If you have been following along, you just finished saving a file at the **CDOS Directory** level and have a few other files stored in your computer.

Once again, begin at the **CDOS Menu**, but this time we will save all the computer files in a single step.

1. Instead of selecting a particular RAM file with the bar cursor, leave it on any of the Model 100 ROM programs (BASIC, TEXT, TELCOM, etc.).

2. Press **<F3>** (Save). The function key line will be replaced with a Save all(Y/N)? prompt.

```
Chipmunk (C) 1984 - Holmes/Amtek    v2.4
 BASIC      TEXT       TELCOM     ADDRSS
 SCHEDL     ADRS.DO    NOTE.DO    UTIL.BA
 SORT.BA    MINIVC.BA  SORT.CO    TP100.CO
 -.-        -.-        -.-        -.-
 -.-        -.-        -.-        -.-
 -.-        -.-        -.-        -.-
Save all(Y/N)?
```

3. Respond with a **<Y>** or **<y>** and the display will move to the disk directory shown on p. 32, but with the "Save" function keys shown on p. 31.

4. Press **<F3>** (Save) or **<ENTER>**.

Each of the files in the Model 100 will be saved to disk in rapid succession.

If a file with the same name already exists, you will receive a `Kill previous copy(Y/N)?` prompt.

Answering **<Y>** or **<y>** will erase the previous copy on the disk and over-write it with the new one from the computer. This will also change the "update flag" date on the file to reflect the current date.

Answering **<N>** or **<n>** will leave that file unchanged on the disk and proceed to the next file to be saved.

When "Save All" is finished, the display will return to the **CDOS Menu.** To verify the operation, return to the disk directory by pressing **<F8>** (`Disk`).

The **CDOS Directory** will now reflect all the files in your computer's memory, displayed in the order in which they were saved on the disk:

```
343.5K free.            In disk disk name
 UTIL.BA    ADRS.DO      NOTE.DO    SORT.BA
 MINIVC.BA  SORT.CO      TP100.CO   -.-
 -.-        -.-          -.-        -.-
 -.-        -.-          -.-        -.-
 -.-        -.-          -.-        -.-
 -.-        -.-          -.-        -.-
Info Load Form                     Kill Menu
```

The display of disk space available has again been reduced to account for the space occupied by these files.

Common errors you may encounter with this function involve insufficient space on the disk (`Disk full`) and trying to exceed 24 entries (`Too many files`).

7. CREATING FOLDERS

The **CDOS Directory** that was created when you formatted the disk only has room for 24 filenames. With this limitation, you would nearly always run out of space on the directory menu long before the disk was full.

As explained in the "Introduction to CDOS", folders are additional disk menus that you create yourself. Each folder has room for 24 entries.

You name each folder when you create it. The data on your disk can be organized so that is logically stored and easy to find.

Creating folders is part of the function that saves files to disk, and is the reason why saving files involves two steps.

To save a file into a new folder, start at the **CDOS Menu** and select the file to be saved (e.g., `MINIVC.BA`).

Follow steps 1. and 2. on p. 31. After pressing **<F3>** at the **CDOS Menu**, the **CDOS Directory** will appear:

```
Saving MINIVC.BA     In disk disk name
 UTIL.BA   ADRS.DO    NOTE.DO   SORT.BA
 MINIVC.BA SORT.CO    TP100.CO  -.-
 -.-       -.-        -.-       -.-
 -.-       -.-        -.-       -.-
 -.-       -.-        -.-       -.-
 -.-       -.-        -.-       -.-
           Save Fold                 Menu
```

This is the point at which we will create a new folder to contain the file.

1. Press <F4> (`Fold`).

The bottom line displays `Name folder as:`.

2. Type in a folder name, up to 9 characters long (including numerals, punctuation or graphics characters if you wish) and press **<ENTER>**.

Your **Chipmunk** will create the new folder on disk and take you to its menu:

```
Saving MINIVC.BA    In folder newfolder
              Empty folder





          Save Fold                Menu
```

3a. Press <F3> (`Save`) or <ENTER> to save, <u>or</u>

3b. You may create another folder to contain this file by pressing <F4> again and returning to step **2.**.

After the file is saved the **CDOS Menu** will return. We can verify the operation by pressing <F8> (`Disk`).

```
333K free.          In folder newfolder
 MINIVC.BA -.-       -.-       -.-
 -.-       -.-       -.-       -.-
 -.-       -.-       -.-       -.-
 -.-       -.-       -.-       -.-
 -.-       -.-       -.-       -.-
 -.-       -.-       -.-       -.-
Info Load Form                Kill Menu
```

Note that **CDOS** returned you directly to the folder you just used for saving that file, not to the top-level **CDOS Directory**.

In the future we will refer to this as the working folder. It is a like the file folder you left open on your desk when you went for coffee. It will still be open when you return (unless your secretary is far more efficient than most).

The **Chipmunk** will remember where you were and go directly to that working folder as long as you don't remove the disk from the drive. If you take out the disk and reinsert it, or if you change disks, <F8> at the **CDOS Menu** will take you to the top-level **CDOS Directory**.

Moving around among the various folders on a disk is easy. The keystrokes are similar to the ones you use in the Model 100's Text Editor program.

> <ENTER> - With the bar cursor on a folder name (lower case) drops down into that folder.

> <SHIFT>-<UP-ARROW> - In any folder goes up one level to the directory or folder that contains it (parent folder).

> <CTRL>-<UP-ARROW> - In any folder goes straight to the top-level **CDOS Directory**.

At the display of the folder you just created, press either <SHIFT>-<UP-ARROW> or <CTRL>-<UP-ARROW> (either one will work because you are only on the second level of the file structure).

```
333K free.           In disk disk name
 UTIL.BA   ADRS.DO    NOTE.DO   SORT.BA
 MINIVC.BA SORT.CO    TP100.CO  newfolder
 -.-       -.-        -.-       -.-
 -.-       -.-        -.-       -.-
 -.-       -.-        -.-       -.-
 -.-       -.-        -.-       -.-
Info Load Form                Kill Menu
```

The folder you just created is now listed on the **CDOS Directory**. <u>Lower</u> <u>case</u> is used to distinguish folders from files on menu displays.

If you put the bar cursor on the folder name and press **<ENTER>**, **The Chipmunk** will go into that folder and show a display like the one on the bottom of p. 37.

You may also create folders during the "Save All" operation described on pp. 34-35.

If you change your mind after pressing **<F4>** (Fold) **<SHIFT>**-**<BREAK>** or **<CTRL>**-**<C>** will abort the function.

Pressing **<ENTER>** without typing a folder name at the prompt will cause the new folder to be named as an asterisk (*).

Creating a folder uses 1.5K of disk space, needed to contain the menu of filenames you see on the display. **CDOS** allows many levels of folders nested inside one another. In fact, it is theoretically possible to have 239 folders on a disk (of course, you wouldn't have any room left for data).

Like disk files, folders may be "killed" using **<F7>** as long as they do not contain files (the files must be individually removed with **<F7>** first).

F1 - "INFO" ON FOLDERS

1. Place the bar cursor on a folder name (lower case) and press **<F1>** (Info).

The date you created the folder will be shown in the lower left corner of the screen.

BUILDING YOUR DISK LIBRARY

One of the first things you will probably want to do is transfer your programs and text files from whatever storage medium you have been using onto **Chipmunk** disks.

CDOS does not interfere with any of the normal Model 100 functions as long as the drive is connected and turned on. For example, you can:

> Use your cassette recorder to load any type of file (.DO, .BA or .CO) into the computer, then save them onto disk.

> Transfer your files from another computer using the RS-232 serial interface and save them from RAM onto **Chipmunk** disk.

> Use the TELCOM program and the built-in modem to download files into RAM and save them to disk.

NOTE: Machine language programs that conflict with **CDOS** when they are executed may still be stored on disk.

8. LOADING DISK FILES

To illustrate loading files from disk, we will begin with an "empty" Model 100 containing **CDOS**. The **CDOS Menu** will look like this:

```
Chipmunk (C) 1984 - Holmes/Amtek    v2.4
 BASIC      TEXT       TELCOM     ADDRSS
 SCHEDL     -.-        -.-        -.-
 -.-        -.-        -.-        -.-
 -.-        -.-        -.-        -.-
 -.-        -.-        -.-        -.-
 -.-        -.-        -.-        -.-
Info Load Save        Name Help Kill Disk
```

1. Insert a disk that contains data into the drive and press **<F8>** (Disk).

The **CDOS Directory** will appear on the display:

```
333K free.             In disk disk name
 UTIL.BA    ADRS.DO    NOTE.DO    SORT.BA
 MINIVC.BA  SORT.CO    TP100.CO   newfolder
 -.-        -.-        -.-        -.-
 -.-        -.-        -.-        -.-
 -.-        -.-        -.-        -.-
 -.-        -.-        -.-        -.-
Info Load Form                  Kill Menu
```

<u>There are two ways to load a file or program</u>.

1. **Load Only**   2. **Load & Execute**

LOAD ONLY

2a. Place the bar cursor on the file to be loaded (e.g., `TP100.CO`) and press **<F2>** (`Load`).

The file you selected will load into the Model 100 and the display will stay in the disk directory or working folder you are using.

The upper left corner of the Model 100 display will show `Loading TP100  .CO` in reverse video while that file is loading. When loading is finished, the display of available disk space will return.

If you missed the `Loading TP100  .CO` display at first, it is because a small file will load in less than one second. We told you the **Chipmunk** was fast!

Returning to the **CDOS Menu** with **<F8>** (`Menu`) now shows the file you just loaded:

```
Chipmunk (C) 1984 - Holmes/Amtek    v2.4
 BASIC     TEXT      TELCOM    ADDRSS
 SCHEDL    TP100.CO  -.-       -.-
 -.-       -.-       -.-       -.-
 -.-       -.-       -.-       -.-
 -.-       -.-       -.-       -.-
 -.-       -.-       -.-       -.-
Info Load Save     Name Help Kill Disk
```

This is the preferred method when you want to load several selected files from a folder. Each file will load into the computer at the rate of about 1K per second. When you want to load a single program or text file into the computer and immediately execute it, the "Load and Execute" method works best.

LOAD AND EXECUTE

2b. Place the bar cursor on the disk file you wish to load and execute, then press **<ENTER>**.

In one step, the file will load from disk into the computer, be entered on the Model 100's menu, and begin execution.

> A text file (.DO) will appear on
  the screen.

> A BASIC program (.BA) will begin
  to run (execute).

> A machine language program (.CO)
  will prompt `Remove CDOS(Y/N)?`
  {more about this under "Utilities"}.

Several errors are commonly associated with loading files from disk. Press any key to recover if they occur.

`Error 7 Out of Memory -`
The file you are trying to load is larger than the Model 100's available RAM memory.

`Error 67 CRC Error -`
The **Chipmunk** was not able to read the file correctly. A couple of retries will often overcome "CRC" errors.

`Error 66 Lost Data -`
The file cannot be read. This very infrequent message usually denotes a file that is irrevocably lost.

THE "LOAD ALL" FEATURE

The **Chipmunk** is capable of loading all the files in a **CDOS Directory** or folder in one step.

This feature is limited by the amount of available memory and the number of open directory (menu) slots in the Model 100.

1. At the **CDOS Menu**, press **<F2>** (Load).

The **Chipmunk** will go to the **CDOS Directory** or to your working folder and display new function keys:

```
Loading                  In disk disk name
 UTIL.BA    ADRS.DO    NOTE.DO    SORT.BA
 MINIVC.BA  SORT.CO    TP100.CO   newfolder
 -.-        -.-        -.-        -.-
 -.-        -.-        -.-        -.-
 -.-        -.-        -.-        -.-
 -.-        -.-        -.-        -.-
All  Load                              Menu
```

2. Press **<F1>** (All) to load all the files in rapid succession. Folder names on the menu will be skipped.

Each filename will be displayed in the upper left corner of the display as it loads. When this part of the screen goes blank (no filename), the process is complete.

If a file with the same name already exists in the computer, `Kill previous copy(Y/N)?` will appear.

Pressing **<F2>** (Load) at the screen above will let you load the files selectively using the bar cursor.

IV. CDOS UTILITIES

1. THE TELCOM UTILITY

When you are operating your Model 100 under **CDOS** a new feature is added to the built-in TELCOM program that is not part of the computer's telecommunications package.

Any time you are logged into a computer network using TELCOM, the following additional information will be available:

1. Press **<F6>**. Your screen will display the number of bytes free in the Model 100's RAM memory.

This is an extremely useful bit of information when you want to download data from a host computer. It lets you to estimate whether or not you have enough memory available to download the entire file.

2. Press **<F7>**. A list of the current filenames in your Model 100's RAM memory will be displayed.

This feature is also helpful when downloading files. It will prevent you from accidentally giving a new file the same name as (and therefore over-writing) one that is already in your computer.

NOTE: Neither of these function keys are labelled when you are in TELCOM, but they are active in CDOS.

2. THE LINE FEED UTILITY

All Radio Shack printers automatically add a line feed (0A Hex, 10 Dec) to a carriage return (0D Hex, 13 Dec). Therefore, TRS-80 computers (including the Model 100) do not send line feeds to the printer.

Many non-Radio Shack printers do not add a line feed to carriage returns, and some do not have a DIP switch to control this function. Therefore, many Model 100 users have had to use BASIC programs to cope with this problem.

CDOS solves this problem with a built-in machine language routine that lets you select between the two options (line feeds added or not).

1. With **CDOS** in the computer, and the **Chipmunk** connected and turned on, go into BASIC.

2a. Type **POKE -1, 1** and press **<ENTER>**. Your Model 100 is now set (until your next "cold start") to send line feeds to the printer along with carriage returns.

2b. Type **POKE -1, 0** and press **<ENTER>**. This will return the Model 100 to the default setting of no line feeds accompanying carriage returns.

Unless you go into BASIC while using **CDOS** and enter **2a.** above, the "default" setting of no line feeds will always be operative.

A "cold start" will always reinitialize your computer to the default setting of no line feeds sent with carriage returns.

3. BACKING UP DISK FILES

The inherent memory limitations of the Model 100 make disk file backups using a single-drive disk system very difficult because of the small buffer space in the computer.

Three alternatives are available, each with its own advantages and disadvantages:

1. Use a backup utility program to copy the entire contents of one disk onto another.

Using the **Chipmunk**, even with an empty 32K Model 100, this is a time-consuming process requiring many disk "swaps". This is a major disadvantage, and therefore we have not included this kind of backup utility as a part of **CDOS**.

2. Format two disks with the same name and carry them together. Save important files or programs twice, once on each disk, so that you have a "running backup".

This is the recommended method. The insignificant difference in weight and bulk between one and two disks is hardly noticeable. The security of having two separate copies of your files is always reassuring.

3. Save important files at least twice in different folders on the same disk.

This method is quicker and more convenient than 2., above, but may lead to confusion when you start updating files on the disk. Also, if you lose or damage the disk there is no "backup" on a second disk. This recommended as a fairly effective method of backing up files.

4. MACHINE LANGUAGE PROGRAMS

The uppermost point of user-addressable memory in a "stock" Model 100 (i.e., MAXRAM) is **62960**. Loading **CDOS** allocates 4218 bytes at the top of memory for the disk operating system and moves the value of MAXRAM down to **58742**.

Most machine language programs (`.CO`) execute at a pre-determined location in high memory that will over-write a portion of **CDOS**, crippling one or more of its functions.

This happens when the program is executed (run). Simply loading the program into the computer will not affect **CDOS**.

CDOS includes a unique utility to prevent conflicts in high memory. When you begin to run any M/L program, you will be asked `Remove CDOS(Y/N)?`.

The disk operating system may then be temporarily removed to accomodate a program that will conflict with it.

Some M/L programs, especially ones that load from a BASIC, will not conflict because they execute below the current value of MAXRAM or HIMEM (or can easily be modified to do so). This is the reason for the choice.

If you inadvertently "cripple" **CDOS** with another M/L program, repairing it without a "cold start" is easy. From BASIC, remove the damaged version using LFILES OFF (see next section). Then go to the Main Menu and reload it using **<RESET>**.

V. CDOS BASIC

1. INTRODUCTION

The Model 100's ROM was used whenever possible in implementing **CDOS**, and new commands needed for disk operation follow Model 100 syntax.

The **Chipmunk** and **CDOS** will be compatible with most programs currently available for the Model 100.

CDOS will also be fundamentally compatible with programs written in "Disk BASIC" for the Radio Shack Disk/Video Interface.

For example, BASIC programs that write data files to the computer's RAM will be easy to adapt so that they write the same data directly to disk.

This section will not reiterate BASIC syntax that is covered in the Model 100 Owners Manual unless **CDOS** syntax is different.

Also, this is not intended as a definitive guide for programmers, but as a brief summary of **CDOS** commands for extending the capabilities of the **Chipmunk** through BASIC programming.

This section of the manual will use the conventions that are employed in the Model 100 Owners Manual for presenting BASIC syntax.

2. CDOS BASIC SYNTAX

CALL 0

The BASIC command equivalent of **<RESET>**, loads **CDOS** (used as an immediate command or program statement).

CLOSE file number list

Closes the specified file number(s), i.e., buffers, that were opened (see **OPEN**). File number list is optional. If omitted, BASIC closes all open buffers.

DSKI$ (drive,track,sector,sector switch)

Reads data from the specified 1/2-sector of the disk -- drive <u>must</u> be 0, track 0-79, sector 1-18, switch 0 gets first half of sector, switch 1 gets second half.

<u>Example</u>:

```
10 PRINT DSKI$ (0,4,1,0)
```

Will print on the LCD the contents of the first half of sector 1 or track 4.

DSKO$ drive,track,sector,sector switch,variable list

Writes the data specified in variable list to the specified location on disk -- drive <u>must</u> be 0, track 0-79, sector 1-18, switch 0 gets first half of sector, switch 1 gets second half.

Variable list may be a string or literal expression, limited to 128 bytes.

Example:

```
10 A$ = "1234567890"
20 DSKO$ 0,35,5,1,A$
```

Writes 1234567890 onto the second half of sector 5 of track 35 on the disk.

EOF (file number)

Tests for an end of file condition in the specified file (buffer) number. Detecting an end-of-file marker returns a -1 ("true"). No end-of-file marker returns 0 ("false").

Example:

```
10 IF EOF(1) THEN CLOSE:MENU
```

Checks the file assigned to buffer 1 for end of file. If EOF is found, the program closes all buffers and goes to the Main Menu.

INPUT# file number, variable list

Inputs data sequentially from the file opened under file (buffer) number. Elements in the variable list must be separated by commas in the file.

Example:

```
10 INPUT#1,A$,B$,C$
```

Inputs the contents of A$, B$ and C$ from the open file assigned to buffer #1.

INPUT$ (numeric expression, file number)

Inputs a string of the length of numeric expression from the file opened under file (buffer) number. The numeric expression must be in the range of 1 to 255.

Example:

```
10 A$ = INPUT$(10,2)
```

Inputs 10 characters from the open file assigned to file (buffer) #2, and assigns the input string to A$.

LFILES

Displays on the LCD a scrolled listing of the contents of the working **CDOS** directory or folder.

LFILES OFF

Removes **CDOS** from RAM and restores the computer to "stock" parameters; i.e., MAXRAM = 62960.

LOAD "0:filename.extension"

Loads the disk file with the specified filename into RAM. The specified file must be in the working directory or menu, and must be stored in ASCII format.

The file will be prepared for execution; i.e., "tokenized" into BASIC format as it is loaded.

NOTE: ASCII format disk files may have any two-letter extension (or none at all). The computer will internally recognize them as ASCII files.

Example:

```
LOAD "0:MINIVC.DO"
```

Loads the BASIC program, MINIVC, that is stored on the disk in ASCII format and "tokenizes" it into BASIC.

MERGE "0:filename.DO"

Merges the BASIC program stored in ASCII format on the disk with a resident BASIC program. If there are duplicate line numbers, the lines from the incoming file will replace the resident lines.

OPEN "0:filename" **FOR** mode **AS** file number

Allocates a buffer for the input or output of a disk file. If your program uses more than one buffer at once, you must reset MAXFILES.

Examples

```
10 OPEN "0:EXP.DO" FOR INPUT AS 1
```

Opens buffer #1 for inputting data from the EXP.DO file on the disk. The file must be in the working directory or menu.

```
10 OPEN "0:ADRS.DO" FOR OUTPUT AS 2
```

Creates an entry on the disk's working directory or menu named ADRS.DO to accept data from the computer sent via buffer #2.

```
10 OPEN "0:NOTE.DO" FOR APPEND AS 3
```

Either opens an existing disk file on the disk's working directory or menu named NOTE.DO or creates a new one to accept data sent from the computer via buffer #3.

PRINT# file number, expression list

Prints the values of expression list to the file opened as file (buffer) number. Commas or semi-colons are used to separate items in expression list, which may be variables or literals.

<u>Example</u>:

```
10 OPEN "0:NOTE.DO" FOR OUTPUT AS 1
20 PRINT#1, A$
```

Prints the value assigned to A$ to disk via buffer #1.

RUN "0:filename.DO"

Loads the specified file in the disk's working directory or fold, tokenizes it from ASCII into BASIC, and executes it.

SAVE "0:filename.extension",A

Used in BASIC to save the file to disk in the current directory or folder with the filename and extension specified. Disk files that are saved or loaded directly from BASIC must be in ASCII format.

<u>NOTE</u>: ASCII format disk files may have <u>any</u> two-letter extension (or none at all). The computer will internally recognize them as ASCII files.